

treatment or heat treatment, whereby adhesion between the separation layer and the insulating film formed later can be controlled.

Each of the insulating films can be formed by a sputtering method, a plasma CVD method, a coating method, a printing method, or the like. For example, the insulating layer is formed at a temperature of higher than or equal to 250° C. and lower than or equal to 400° C. by a plasma CVD method, whereby the insulating layer can be a dense film with very low water permeability.

Then, a material for the sealing layer 413 is applied to a surface of the formation substrate 505 over which the coloring layer 459 and the like are formed or a surface of the formation substrate 501 over which the light-emitting element 430 and the like are formed, and the formation substrate 501 and the formation substrate 505 are attached with the sealing layer 413 positioned therebetween (see FIG. 14C).

Next, the formation substrate 501 is separated, and the exposed insulating layer 405 and the substrate 401 are attached to each other with the bonding layer 403. Furthermore, the formation substrate 505 is separated, and the exposed insulating layer 455 and the substrate 303 are attached to each other with the bonding layer 305. Although the substrate 303 does not overlap with the conductive layer 357 in FIG. 15A, the substrate 303 may overlap with the conductive layer 357.

Any of a variety of methods can be used as appropriate for the separation process. For example, when a layer including a metal oxide film is formed as the separation layer on the side in contact with the layer to be separated, the metal oxide film is embrittled by crystallization, whereby the layer to be separated can be separated from the formation substrate. Alternatively, when an amorphous silicon film containing hydrogen is formed as the separation layer between the formation substrate having high heat resistance and the layer to be separated, the amorphous silicon film is removed by laser light irradiation or etching, whereby the layer to be separated can be separated from the formation substrate. Alternatively, after a layer including a metal oxide film is formed as the separation layer on the side in contact with the layer to be separated, the metal oxide film is embrittled by crystallization, and part of the separation layer is removed by etching using a solution or a fluoride gas such as NF_3 , BrF_3 , or ClF_3 , whereby the separation can be performed at the embrittled metal oxide film. Furthermore, a method may be used in which a film containing nitrogen, oxygen, hydrogen, or the like (for example, an amorphous silicon film containing hydrogen, an alloy film containing hydrogen, an alloy film containing oxygen, or the like) is used as the separation layer, and the separation layer is irradiated with laser light to release the nitrogen, oxygen, or hydrogen contained in the separation layer as a gas, thereby promoting separation between the layer to be separated and the formation substrate. Alternatively, it is possible to use a method in which the formation substrate provided with the layer to be separated is removed mechanically or by etching using a solution or a fluoride gas such as NF_3 , BrF_3 , or ClF_3 , or the like. In this case, the separation layer is not necessarily provided.

Furthermore, the separation process can be conducted easily by combination of the above-described separation methods. In other words, separation can be performed with physical force (by a machine or the like) after performing laser light irradiation, etching on the separation layer with a gas, a solution, or the like, or mechanical removal with a sharp knife, scalpel or the like so that the separation layer and the layer to be separated can be easily separated from each other.

Separation of the layer to be separated from the formation substrate may be carried out by filling the interface between the separation layer and the layer to be separated with a liquid. Furthermore, the separation may be conducted while pouring a liquid such as water.

As another separation method, in the case where the separation layer is formed using tungsten, it is preferable that the separation be performed while etching the separation layer using a mixed solution of ammonium water and a hydrogen peroxide solution.

Note that the separation layer is not necessary in the case where separation at the interface between the formation substrate and the layer to be separated is possible. For example, glass is used as the formation substrate, an organic resin such as polyimide is formed in contact with the glass, and an insulating film, a transistor, and the like are formed over the organic resin. In this case, heating the organic resin enables the separation at the interface between the formation substrate and the organic resin. Alternatively, separation at the interface between a metal layer and the organic resin may be performed in the following manner: the metal layer is provided between the formation substrate and the organic resin and current is made to flow in the metal layer so that the metal layer is heated.

Lastly, an opening is formed in the insulating layer 455 and the sealing layer 413 to expose the conductive layer 357 (see FIG. 15B). In the case where the substrate 303 overlaps with the conductive layer 357, the opening is formed also in the substrate 303 and the bonding layer 305 (see FIG. 15C). The method for forming the opening is not particularly limited and may be, for example, a laser ablation method, an etching method, an ion beam sputtering method, or the like. As another method, a cut may be made in a film over the conductive layer 357 with a sharp knife or the like and part of the film may be separated by physical force.

In the above-described manner, the light-emitting panel can be manufactured.

As described above, the light-emitting panel of this embodiment includes two substrates; one is the substrate 303 and the other is the substrate 401 or the substrate 402. The light-emitting panel can be formed with two substrates even when including a touch sensor. Owing to the use of the minimum number of substrates, improvement in light extraction efficiency and improvement in clarity of display can be easily achieved.

Examples of the electronic devices to which the flexible light-emitting device is applied include television sets (also referred to as televisions or television receivers), monitors of computers or the like, cameras such as digital cameras or digital video cameras, digital photo frames, mobile phones (also referred to as cellular phones or cellular phone devices), portable game consoles, portable information terminals, audio reproducing devices, large-sized game machines such as pachinko machines, and the like.

This embodiment can be implemented in an appropriate combination with any of the structures described in the other embodiments.

This application is based on Japanese Patent Application serial no. 2013-150236 filed with Japan Patent Office on Jul. 19, 2013, the entire contents of which are hereby incorporated by reference.

What is claimed is:

1. A support of a flexible component comprising:
 - a first substrate;
 - a second substrate;
 - a first rack;
 - a first pinion; and